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(54) FLOW DIVERTER TO REDIRECT SECONDARY FLOW

STRÖMUNGSUMLENKER ZUR UMLEITUNG EINER SEKUNDÄREN STRÖMUNG

DISPOSITIF DE DÉRIVATION D'ÉCOULEMENT PERMETTANT DE REDIRIGER UN ÉCOULEMENT SECONDAIRE

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Description

BACKGROUND

[0001] The invention relates to gas turbine engines, and more particularly to a secondary gas flow within gas turbine engines.

[0002] Gas turbine engines operate according to a continuous-flow, Brayton cycle. A compressor section pressurizes an ambient air stream, fuel is added and the mixture is burned in a central combustor section. The combustion products expand through a turbine section where bladed rotors convert thermal energy from the combustion products into mechanical energy for rotating one or more centrally mounted shafts. The shafts, in turn, drive the forward compressor section, thus continuing the cycle. Gas turbine engines are compact and powerful power plants, making them suitable for powering aircraft, heavy equipment, ships and electrical power generators. In power generating applications, the combustion products can also drive a separate power turbine attached to an electrical generator.

[0003] Seals are required in many locations within a gas turbine engine to regulate air flow to various portions of the engine. From time to time these seals may become damaged, fail or provide for inadequate sealing. This can result in the undesirable heating of engine components.

[0004] EP 1 780 380 relates to a gas turbine blade to vane interface seal. US 5,402,636 relates to thrust balancing for gas turbine engines.

SUMMARY

[0005] An assembly for a gas turbine engine is provided as set forth in claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a partial cross-sectional view of an exemplary gas turbine engine.

FIG. 2 is a cross-section of an assembly including a finger seal, a flow diverter, and a labyrinth seal.

FIG. 3A is an enlarged cross-section of the assembly of FIG. 2 including the finger seal, the flow diverter, and the labyrinth seal.

FIG. 3B is a perspective sectional view showing the finger seal, the flow diverter, and the labyrinth seal.

DETAILED DESCRIPTION

[0007] A flow diverter for a gas turbine engine is disposed adjacent a finger seal and between the finger seal and a labyrinth seal. The flow diverter directs a secondary air flow that passes across the finger seal through the labyrinth seal and away from a rotor cavity of the gas turbine engine. The redirected secondary air flow is eventually returned back to a main gas flow path of the gas turbine engine. The addition of the flow diverter makes interfaces between cavities within the gas turbine engine more robust and less susceptible to unwanted leakage. Additionally, the flow diverter provides for a backup seal function if the finger seal becomes damaged or loses functionality.

[0008] An exemplary industrial gas turbine engine 10 is circumferentially disposed about a central, longitudinal axis or axial engine centerline axis 12 as illustrated in FIG. 1.

[0009] The engine 10 includes in series order from front to rear, low and high pressure compressor sections 16 and 18, a central combustor section 20 and high and low pressure turbine sections 22 and 24. In some examples, a free turbine section 26 is disposed aft of the low pressure turbine 24. Although illustrated with reference to an industrial gas turbine engine, this application also extends to aero engines with a fan or gear driven fan, and engines with more or fewer sections than illustrated.

[0010] As is well known in the art of gas turbines, incoming ambient air 30 becomes pressurized air 32 in the compressors 16 and 18. Fuel mixes with the pressurized air 32 in the combustor section 20, where it is burned to produce combustion gases 34 that expand as they flow through turbine sections 22, 24 and power turbine 26. Turbine sections 22 and 24 drive high and low pressure rotor shafts 36 and 38 respectively, which rotate in response to the combustion products and thus the attached compressor sections 18, 16. Free turbine section 26 may, for example, drive an electrical generator, pump, or gearbox (not shown).

[0011] It is understood that FIG. 1 provides a basic understanding and overview of the various sections and the basic operation of an industrial gas turbine engine. It will become apparent to those skilled in the art that the present application is applicable to all types of gas turbine engines, including those with aerospace applications.

[0012] FIG. 2 shows a first module 42 and a second module 44 interconnected by fasteners 45. First module 42 is only partially illustrated in FIG. 2 and includes a frame 46 and a fairing 48. Second module 44 includes an outer radial casing 47, a stator vane 50, vane platform 51, a rotor blade 52, and a rotor disk 53. Frame 46 includes an outer radial casing 54, an inner radial platform 56, and struts 58. Fairing 48 includes an outer radial platform 60, and inner radial platform 62, and strut liners 64. Assembly 66 is disposed radially inward of a main engine gas flow path 68. First module 42 additionally includes a seal support 67 and a first cavity 70. A second cavity 72 is disposed between rotor disk 53 and first module 42 and a third cavity 74 is formed between vane platform 51, seal support 67, and inner radial platform 62 of fairing 48.

[0013] First module 42 comprises a portion of gas turbine engine 10 (FIG. 1), and therefore, can form portions of compressor sections 16 and 18 or turbine sections 22 and 24. First module 42 includes various components

including outer radial casing 54 frame 46 and fairing 48. Second module 44 is connected to first module 42 via fasteners 45 such that modules 42 and 44 abut along outer casings 54 and 47. Second module 44 additionally houses stator vane 50, vane platform 51, rotor blade 52, and rotor disk 53 therein. As shown in the embodiment of FIG. 2, vane 50 and blade 52 are disposed downstream of frame 46 and fairing 48 with respect to the direction of flow of combustion gases 34 along main engine gas flow path 68.

[0014] In the embodiment shown, first module 42 includes frame 46 which extends axially along and generally radially through main engine gas flow path 68. Outer radial casing 54 is connected to inner radial platform 56 by struts 58 (only one is shown in FIG. 2). Seal support 67 extends generally radially outward from inner radial platform 56 to adjacent fairing 48. Fairing 48 is affixed to frame 46 and is adapted to be disposed within frame 46 radially inward of outer radial casing 54 and radially outward of inner radial platform 56. Strut liners 64 are adapted to be disposed around struts 58.

[0015] Outer radial platform 60 of fairing 48 has a generally conical shape. Similarly, inner radial platform 62 has a generally conical shape. Inner radial platform 62 is spaced from outer radial platform 60 by strut liners 64. Outer radial platform 60, inner radial platform 62, and strut liners 64, form a portion of main engine gas flow path 68 of gas turbine engine 10 when assembled. Gases such as combustion gases 34 pass through main engine gas flow path 68 during operation.

[0016] Similar to first module 42, second module 44 includes various components such as outer radial casing 47, stator vane 50, vane platform 51, rotor blade 52, and rotor disk 53. Like vane 50, vane platform 51 is a stator component and forms an inner radial edge of main engine gas flow path 68. Vane platform 51 extends radially inward of main engine gas flow path 68 to interconnect with and support portions of assembly 66. Rotor disk 53 is disposed radially inward of main engine gas flow path 68 and is disposed adjacent portions of assembly 66.

[0017] As will be discussed subsequently, assembly 66 includes two seals and flow diverter. The first seal and flow diverter are mounted to seal support 67 of frame 46. Assembly 66 is located at a radial distance inward from inner radial platform 62 of fairing 48 as well as main engine gas flow path 68. Assembly 66 is disposed between second cavity 72 and third cavity 74. During operation, assembly 66 acts to limit a secondary gas flow from third cavity 74 to second cavity 72. Similarly, assembly 66 limits a leakage gas flow from second cavity 72 to third cavity 74. Assembly 66 allows for mixing of the secondary gas flow and leakage gas flow and releases the mixed gas flow back to main engine gas flow path 68. Assembly 66 makes interfaces between cavities 72 and 74 more robust and less susceptible to unwanted leakage between the cavities 72 and 74. Additionally, assembly 66 provides for a backup seal function in case a portion of assembly 66 becomes damaged or loses functionality. The backup seal function that assembly 66 provides is more durable and cost effective than other backup seal alternatives known in the art.

[0018] FIGS. 3A and 3B show a cross-section of gas turbine engine 10 (FIG. 1) with assembly 66 mounted radially inward of main engine gas flow path 68. In addition to fairing 48, vane 50, vane platform 51, rotor disk 53, inner platform 62, seal support 67, first cavity 70, second cavity 72, and third cavity 74, FIGS. 3A and 3B illustrate various components of assembly 66 including a finger seal 76, a fastener 78, a flow diverter 80, and a labyrinth seal 82. Labyrinth seal 82 includes a land 84 and knife edges 85. Land 84 includes an abradable portion 86 such as honeycomb. Knife edges 85 are formed from a mini-disk 88. A fourth cavity 89 is formed between finger seal 76 and flow diverter 80. A fifth cavity 90 is formed between rotor disk 53, assembly 66, and vane platform 51.

[0019] As shown in FIGS. 3A and 3B various secondary gas flows 92, 94, 96, 98, 100, and 102 can travel between and within cavities 70, 72, 74, 75, and 90. For the purpose of this application, secondary gas flow means any gas flow that is not traveling along main engine gas flow path 68. As combustion gases 34 travel along main engine gas flow path 68, a portion of this flow, comprising secondary gas flow 92 of ingestion gas, can pass radially inward of main engine gas flow path 68 through a gap aft of inner radial platform 62 and forward of vane platform 51. Secondary gas flow 92 enters third cavity 74 where in some instances it is mixed with secondary gas flow 94 comprised of module leakage gas from first cavity 70 to become mixed secondary gas flow 96. In some instances this mixed secondary gas flow 96 can pass across finger seal 76 as indicated by arrow 98. Secondary gas flow 98 is combined and mixed with secondary gas flow 100 (comprised of relatively cooler leakage gas from a rotor cavity such as second cavity 72). The mixed secondary gas flow 102, comprising a mixture of ingestion gas, module leakage gas and/or leakage gas from a rotor cavity, travels back to main engine gas flow path 68 through labyrinth seal 82 and cavity 90.

[0020] Finger seal 76 is mounted to seal support 67 by fastener 78. Finger seal 76 cantilevers to contact and be deflected by an outer radial surface of land 84. Flow diverter 80 is disposed adjacent finger seal 76 radially inward thereof and is also mounted to seal support 67 by fastener 78. In other embodiments, finger seal 76 and flow diverter 80 can be mounted to seal support 67 by other known means such as welds, rivets, and/or clamps.

[0021] As shown in FIG. 3B, flow diverter 80 comprises a full ring and extends away from seal support 67 toward labyrinth seal 82. Flow diverter 80 is positioned to separate fourth cavity 89 from second cavity 72. Flow diverter 80 is spaced from abradable portion 86 of land 84 by a gap G. Thus, flow diverter 80 is disposed so as not to make contact with land 84. Instead gap G allows for a flow path for secondary gas flow 98 to be directed along an inner radial surface of land 84. In this manner, flow

diverter 80 acts to direct secondary gas flow 98 away from second cavity 72 and through labyrinth seal 82. Flow diverter 80 also acts to direct secondary gas flow 100 away from finger seal 76.

[0022] Labyrinth seal 82 is comprised of land 84 and knife edges 85 formed from mini-disk 88. Mini-disk 88 is mounted to rotor disk 53 such that knife edges 85 are disposed in close proximity to (or in contact with) abradable portion 86 of land 84. Mixed secondary gas flow 102 passes between land 84 and knife edges 85, around land 84 and rotor disk 53 to fifth cavity 90. From fifth cavity 90 secondary gas flow 102 travels to main engine gas flow path 68.

[0023] A flow diverter for a gas turbine engine is disposed adjacent a finger seal and between the finger seal and a labyrinth seal. The flow diverter directs a secondary air flow that passes across the finger seal through the labyrinth seal and away from a rotor cavity of the gas turbine engine. The redirected secondary air flow is eventually returned back to a main gas flow path of the gas turbine engine. The addition of the flow diverter makes interfaces between cavities within the gas turbine engine more robust and less susceptible to unwanted leakage. Additionally, the flow diverter provides for a backup seal function if the finger seal becomes damaged or loses functionality.

Discussion of Possible Embodiments

[0024] The following are non-exclusive descriptions of possible embodiments of the present invention.

[0025] An assembly for a gas turbine engine includes a seal and a flow diverter. The flow diverter is disposed adjacent the seal to direct a secondary gas flow that passes across the seal away from a rotor cavity such that the secondary gas flow travels back toward a main gas flow path of the gas turbine engine as set forth in claim 1 and optional features as set forth in the dependent claims.

[0026] While the invention has been described with reference to an exemplary embodiment(s), it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention as defined by the appended claims.

Claims

1. An assembly for a gas turbine engine, comprising:

a seal (76) restricting a secondary flow between a first rotor cavity (70) in communication with a main gas flow path (68) and a second rotor cavity (72); and
a flow diverter (80) disposed adjacent the seal between the first and second rotor cavities that directs the secondary gas flow passing across the seal away from the second rotor cavity such that the secondary gas flow travels back toward a main gas flow path of the gas turbine engine, **characterised in that** the flow diverter is positioned adjacent the seal to act as a backup seal in instances where the seal fails; and
a labyrinth seal (82) disposed adjacent the flow diverter, wherein the flow diverter and a land (84) of the labyrinth seal are arranged to form a gap therebetween that defines a flow path along which the secondary gas flow travels.

2. The assembly of claim 1, wherein the seal contacts an opposing side of the land from the gap.

3. The assembly of claim 1 or 2, wherein the flow path extends between a land and one or more knife edges of the labyrinth seal.

4. The assembly of any of claims 1 to 3, wherein the seal and the flow diverter are positioned radially inward of the main gas flow path of the gas turbine engine, and the flow diverter directs a leakage gas flow from the rotor cavity away from the seal, and optionally wherein the labyrinth seal receives the secondary gas flow that passes across the seal and mixes the secondary gas flow with the leakage gas flow from the rotor cavity.

5. The assembly of any preceding claim, wherein the secondary gas flow:

that passes across the seal comprises a mixture of an ingestion gas flow from the main engine gas flow path and a module leakage gas flow; and/or
is routed around one or more components of the gas turbine engine.

6. The assembly of any preceding claim, wherein the seal comprises a finger seal.

7. The assembly of any preceding claim, wherein the flow diverter comprises a ring.

8. The assembly of claim 1, further comprising:

a first component;
a second component, wherein the first component and the second
component are disposed radially inward of the main gas flow path of the gas turbine engine;
the seal extending between the first component and the second
component; and
the flow diverter mounted to the first component, wherein the flow diverter and the second component are arranged to form a gap therebetween to direct a secondary gas flow that passes

across the seal along the second component, and optionally wherein the secondary gas flow is returned to the main gas flow path of the gas turbine engine.

9. The assembly of claim 8, wherein the second component comprises a labyrinth seal, and wherein the secondary gas flow passes between a land and one or more knife edges of the labyrinth seal.

10. The assembly of claim 8 or 9, wherein the second component is located downstream of the first component with respect to a direction of flow along the main gas flow path, and wherein the flow diverter directs a leakage gas flow from a rotor cavity away from the finger seal, and optionally wherein the labyrinth seal receives the secondary gas flow that passes across the seal and mixes the secondary gas flow with the leakage gas flow from the rotor cavity.

11. The assembly of claim 8, comprising:

a labyrinth seal having one or more lands and one or more knife edges;
the seal disposed adjacent the labyrinth seal; and
the flow diverter disposed between the seal and the labyrinth seal,

wherein the flow diverter is spaced by a gap from the one or more lands of the labyrinth seal.

12. The assembly of claim 11, wherein a secondary gas flow that passes across the seal is directed between the one or more lands and the one or more knife edges of the labyrinth seal by the flow diverter, and optionally wherein the labyrinth seal receives the secondary gas flow that passes across the seal and mixes the secondary gas flow with the leakage gas flow from the rotor cavity and the mixed secondary gas flow and leakage gas flow are then released back to the main gas flow path of the gas turbine engine after passing through the labyrinth seal.

Patentansprüche

1. Baugruppe für einen Gasturbinenmotor, Folgendes umfassend:

eine Dichtung (76), die eine sekundäre Strömung zwischen einem ersten Rotorhohlraum (70), der in Kommunikation mit einem Hauptgasströmungspfad (68) steht, und einem zweiten Rotorhohlraum (72) drosselt; und
einen Strömungsumlenker (80), der neben der Dichtung zwischen dem ersten und dem zweiten Rotorhohlraum angeordnet ist und die sekundäre Gasströmung, die von dem zweiten Rotorhohlraum weg über die Dichtung strömt, so leitet, dass die sekundäre Gasströmung zurück zu einem Hauptgasströmungspfad des Gasturbinenmotors strömt, **dadurch gekennzeichnet, dass** der Strömungsumlenker für Fälle, in denen die Dichtung versagt, als Sicherheitsdichtung neben der Dichtung positioniert ist; und
eine Labyrinthdichtung (82), die neben dem Strömungsumlenker angeordnet ist, wobei der Strömungsumlenker und eine Fläche (84) der Labyrinthdichtung so angeordnet sind, dass sie einen Spalt zwischen sich bilden, der einen Strömungspfad definiert, an dem die sekundäre Gasströmung entlangströmt.

2. Baugruppe nach Anspruch 1, wobei die Dichtung eine gegenüberliegende Seite der Fläche des Spalts berührt.

3. Baugruppe nach Anspruch 1 oder 2, wobei sich der Strömungspfad zwischen einer Fläche und einer oder mehreren Schneidkanten der Labyrinthdichtung erstreckt.

4. Baugruppe nach einem der Ansprüche 1 bis 3, wobei die Dichtung und der Strömungsumlenker von dem Hauptgasströmungspfad des Gasturbinenmotors radial nach innen positioniert sind, und der Strömungsumlenker eine Leckgasströmung aus dem Rotorhohlraum von der Dichtung weg leitet, und wobei gegebenenfalls die Labyrinthdichtung die sekundäre Gasströmung aufnimmt, die über die Dichtung strömt, und die sekundäre Gasströmung mit der Leckgasströmung aus dem Rotorhohlraum vermischt.

5. Baugruppe nach einem der vorhergehenden Ansprüche, wobei die sekundäre Gasströmung:

die über die Dichtung strömt, eine Mischung einer Ingestionsgasströmung von dem Hauptmotorgasströmungspfad und einer Modulleckgasströmung umfasst; und/oder
um eine oder mehrere Komponenten des Gasturbinenmotors herumgeführt wird.

6. Baugruppe nach einem der vorhergehenden Ansprüche, wobei die Dichtung eine Fingerdichtung umfasst.

7. Baugruppe nach einem der vorhergehenden Ansprüche, wobei der Strömungsumlenker einen Ring umfasst.

8. Baugruppe nach Anspruch 1, ferner Folgendes umfassend:

eine erste Komponente;
eine zweite Komponente, wobei die erste Komponente und die zweite Komponente von dem Hauptgasströmungspfad des Gasturbinenmotors radial nach innen angeordnet sind;
die Dichtung, die sich zwischen der ersten Komponente und der zweiten Komponente erstreckt; und
den Strömungsumlenker, der auf der ersten Komponente montiert ist, wobei der Strömungsumlenker und die zweite Komponente so angeordnet sind, dass sie zwischen sich einen Spalt bilden, der eine sekundäre Gasströmung, die über die Dichtung strömt, entlang der zweiten Komponente lenkt, und wobei gegebenenfalls die sekundäre Gasströmung zu dem Hauptgasströmungspfad des Gasturbinenmotors zurückgeführt wird.

9. Baugruppe nach Anspruch 8, wobei die zweite Komponente eine Labyrinthdichtung umfasst, und wobei die sekundäre Gasströmung zwischen einer Fläche und einer oder mehreren Schneidkanten der Labyrinthdichtung vorbeiströmt.

10. Baugruppe nach Anspruch 8 oder 9, wobei sich die zweite Komponente in Bezug auf eine Strömungsrichtung entlang des Hauptgasströmungspfades stromabwärts der ersten Komponente befindet, und wobei der Strömungsumlenker eine Leckgasströmung aus einem Rotorhohlraum von der Fingerdichtung weg lenkt, und wobei gegebenenfalls die Labyrinthdichtung die sekundäre Gasströmung aufnimmt, die über die Dichtung strömt, und die sekundäre Gasströmung mit der Leckgasströmung aus dem Rotorhohlraum vermischt.

11. Baugruppe nach Anspruch 8, Folgendes umfassend:

eine Labyrinthdichtung, die eine oder mehrere Flächen und eine oder mehrere Schneidkanten aufweist;
die Dichtung, die neben der Labyrinthdichtung angeordnet ist; und
den Strömungsumlenker, der zwischen der Dichtung und der Labyrinthdichtung angeordnet ist, wobei der Strömungsumlenker durch einen Spalt von der einen oder den mehreren Flächen der Labyrinthdichtung beabstandet ist.

12. Baugruppe nach Anspruch 11, wobei eine sekundäre Gasströmung, die über die Dichtung strömt, durch den Strömungsumlenker zwischen die eine oder die mehreren Flächen und die eine oder die mehreren Schneidkanten der Labyrinthdichtung geleitet wird, und wobei gegebenenfalls die Labyrinthdichtung die sekundäre Gasströmung, die über die Dichtung strömt, aufnimmt, und die sekundäre Gasströmung und die Leckgasströmung aus dem Rotorhohlraum vermischt, und die vermischte sekundäre Gasströmung und Leckgasströmung wieder zurück in den Hauptgasströmungspfad des Gasturbinenmotors gelassen werden, nachdem sie durch die Labyrinthdichtung geströmt sind.

Revendications

1. Ensemble pour moteur à turbine à gaz, comprenant :

un joint d'étanchéité (76) limitant un écoulement secondaire entre une première cavité de rotor (70) en communication avec une voie d'écoulement de gaz principale (68) et une seconde cavité de rotor (72) ; et
un dispositif de dérivation d'écoulement (80) disposé de manière adjacente au joint d'étanchéité entre les première et seconde cavités de rotor qui dirige l'écoulement de gaz secondaire traversant le joint d'étanchéité en l'éloignant de la seconde cavité de rotor de sorte que l'écoulement de gaz secondaire retourne vers une voie d'écoulement de gaz principale du moteur à turbine à gaz,
caractérisé en ce que le dispositif de dérivation d'écoulement est positionné de manière adjacente au joint d'étanchéité pour agir comme un joint d'étanchéité de secours dans les cas où le joint d'étanchéité est défaillant ; et
un joint labyrinthe (82) disposé de manière adjacente au dispositif de dérivation d'écoulement, dans lequel le dispositif de dérivation d'écoulement et une surface (84) du joint labyrinthe sont agencés pour former entre eux un espace qui définit une voie d'écoulement le long de laquelle l'écoulement de gaz secondaire se déplace.

2. Ensemble selon la revendication 1, dans lequel le joint d'étanchéité entre en contact avec un côté opposé de la surface à partir de l'espace.

3. Ensemble selon les revendications 1 ou 2, dans lequel la voie d'écoulement s'étend entre une surface et une ou plusieurs arêtes du joint labyrinthe.

4. Ensemble selon l'une quelconque des revendications 1 à 3, dans lequel le joint d'étanchéité et le dispositif de dérivation d'écoulement sont positionnés radialement vers l'intérieur de la voie d'écoulement de gaz principale du moteur à turbine à gaz, et le dispositif de dérivation d'écoulement dirige un écoulement de fuite de gaz provenant de la cavité de rotor en l'éloignant du joint d'étanchéité, et éventuellement dans lequel le joint labyrinthe reçoit l'écoulement de gaz secondaire qui traverse le joint

d'étanchéité et mélange l'écoulement de gaz secondaire à l'écoulement de fuite de gaz provenant de la cavité de rotor.

5. Ensemble selon une quelconque revendication précédente, dans lequel l'écoulement de gaz secondaire :

qui traverse le joint d'étanchéité comprend un mélange d'un écoulement de gaz d'ingestion provenant de la voie d'écoulement de gaz principale du moteur et d'un écoulement de fuite de gaz de module ; et/ou
est acheminé autour d'un ou de plusieurs composants du moteur à turbine à gaz.

6. Ensemble selon une quelconque revendication précédente, dans lequel le joint d'étanchéité comprend un joint à doigts.

7. Ensemble selon une quelconque revendication précédente, dans lequel le dispositif de dérivation d'écoulement comprend un anneau.

8. Ensemble selon la revendication 1, comprenant en outre : un premier composant ;
un second composant, dans lequel le premier composant et le second
composant sont disposés radialement à l'intérieur de la voie d'écoulement de gaz principale du moteur à turbine à gaz ;
le joint d'étanchéité s'étendant entre le premier composant et le second
composant ; et
le dispositif de dérivation d'écoulement étant monté sur le premier composant, dans lequel le dispositif de dérivation d'écoulement et le second composant sont agencés de manière à former un espace entre eux pour diriger un écoulement de gaz secondaire qui traverse le joint d'étanchéité le long du second composant, et éventuellement dans lequel l'écoulement de gaz secondaire est renvoyé vers la voie d'écoulement de gaz principale du moteur à turbine à gaz.

9. Ensemble selon la revendication 8, dans lequel le second composant comprend un joint labyrinthe, et dans lequel l'écoulement de gaz secondaire passe entre une surface et une ou plusieurs arêtes du joint labyrinthe.

10. Ensemble selon les revendications 8 ou 9, dans lequel le second composant est situé en aval du premier composant par rapport à une direction d'écoulement le long de la voie d'écoulement de gaz principale, et dans lequel le dispositif de dérivation d'écoulement dirige un écoulement de fuite de gaz provenant d'une cavité de rotor en l'éloignant du joint à doigts, et éventuellement dans lequel le joint labyrinthe reçoit l'écoulement de gaz secondaire qui traverse le joint et mélange l'écoulement de gaz secondaire avec l'écoulement de fuite de gaz provenant de la cavité de rotor.

11. Ensemble selon la revendication 8, comprenant :

un joint labyrinthe ayant une ou plusieurs surfaces et une ou plusieurs arêtes ;
le joint d'étanchéité disposé de manière adjacente au joint labyrinthe ; et
le dispositif de dérivation d'écoulement disposé entre le joint d'étanchéité et le joint labyrinthe,
dans lequel le dispositif de dérivation d'écoulement est séparé des une ou plusieurs surfaces du joint labyrinthe par un espace.

12. Ensemble selon la revendication 11, dans lequel un écoulement de gaz secondaire qui traverse le joint d'étanchéité est dirigé entre les une ou plusieurs surfaces et les une ou plusieurs arêtes du joint labyrinthe par le dispositif de dérivation d'écoulement, et éventuellement dans lequel le joint labyrinthe reçoit l'écoulement de gaz secondaire qui traverse le joint d'étanchéité et mélange l'écoulement de gaz secondaire à l'écoulement de fuite de gaz provenant de la cavité de rotor et l'écoulement de gaz secondaire mélangé et l'écoulement de fuite de gaz sont ensuite renvoyés vers la voie d'écoulement de gaz principale du moteur à turbine à gaz après avoir traversé le joint labyrinthe.

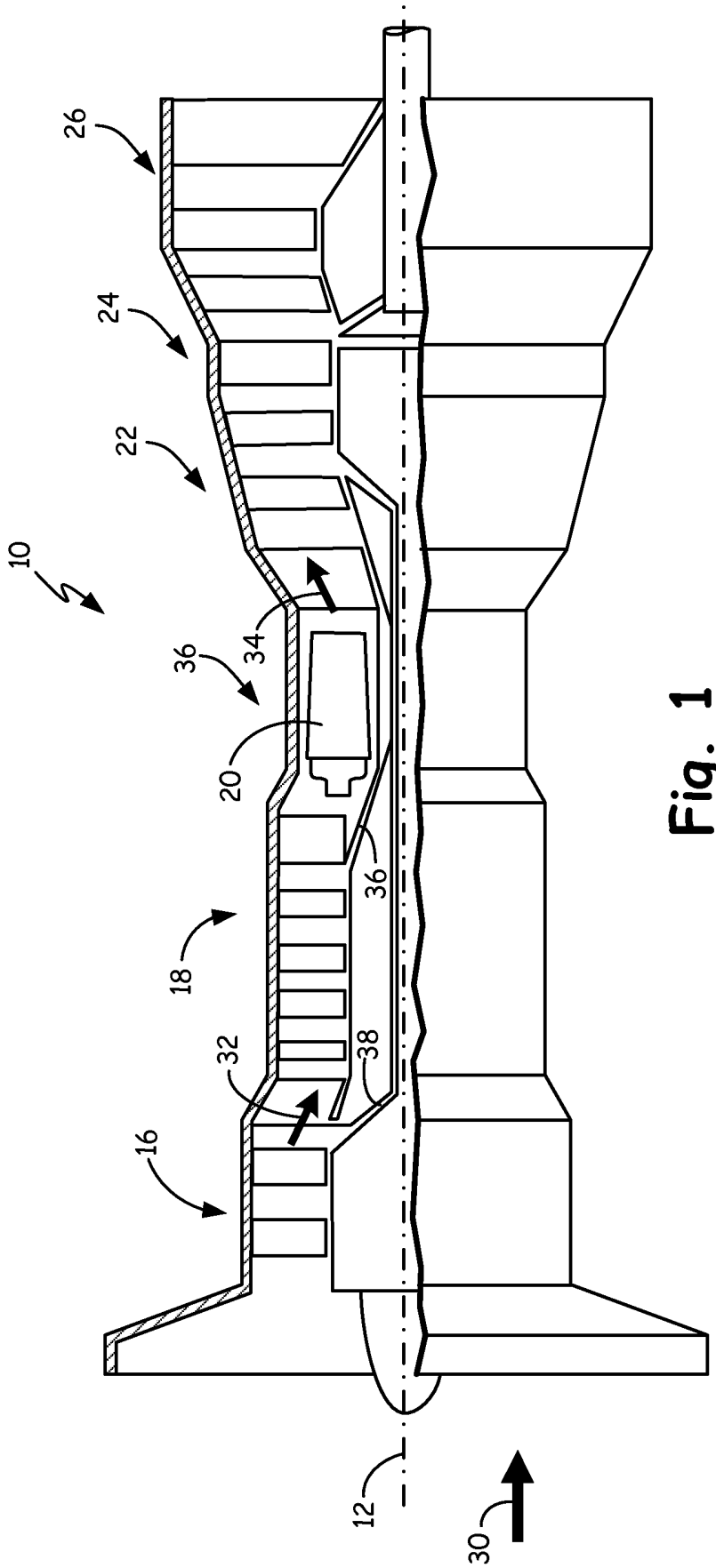


Fig. 1

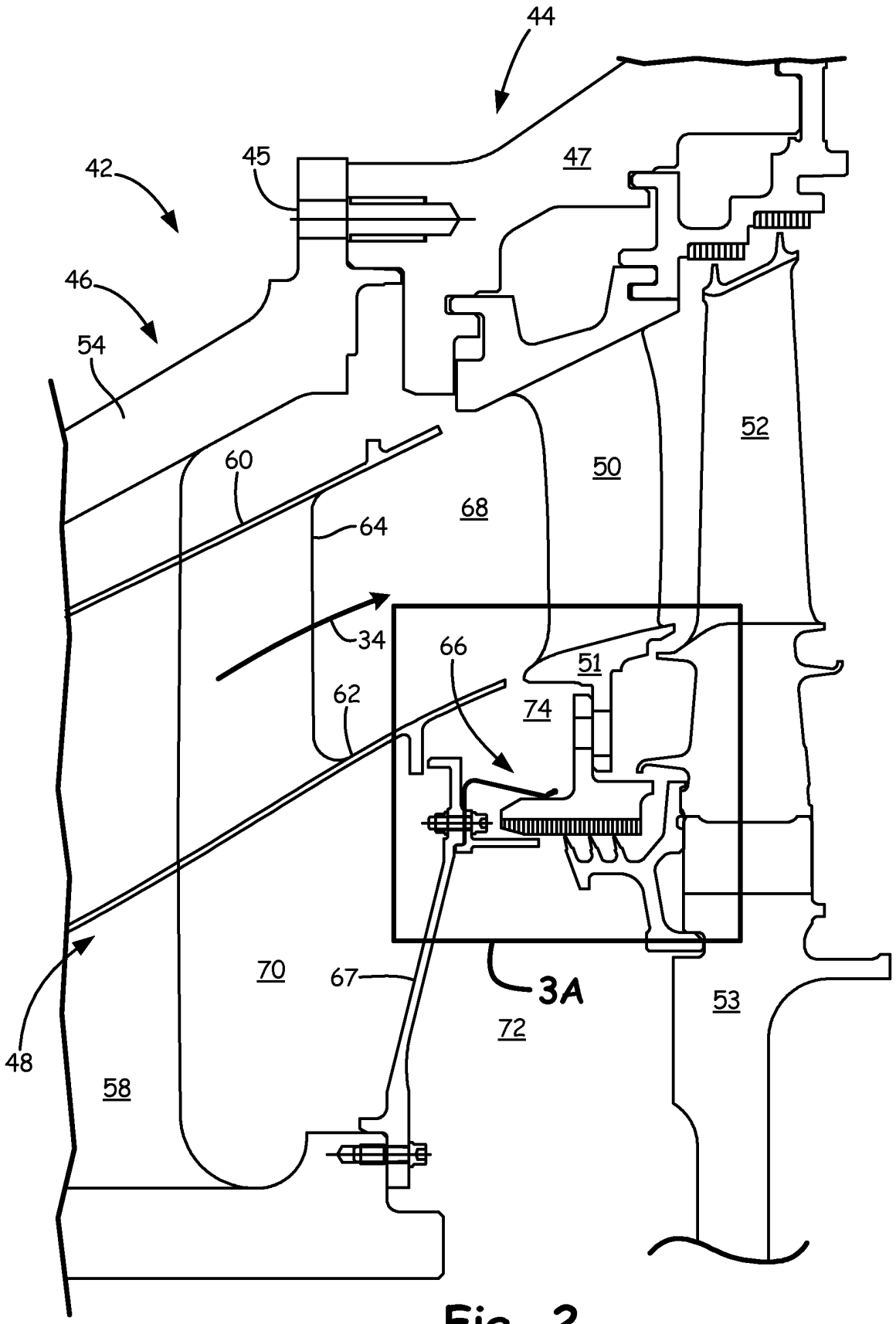


Fig. 2

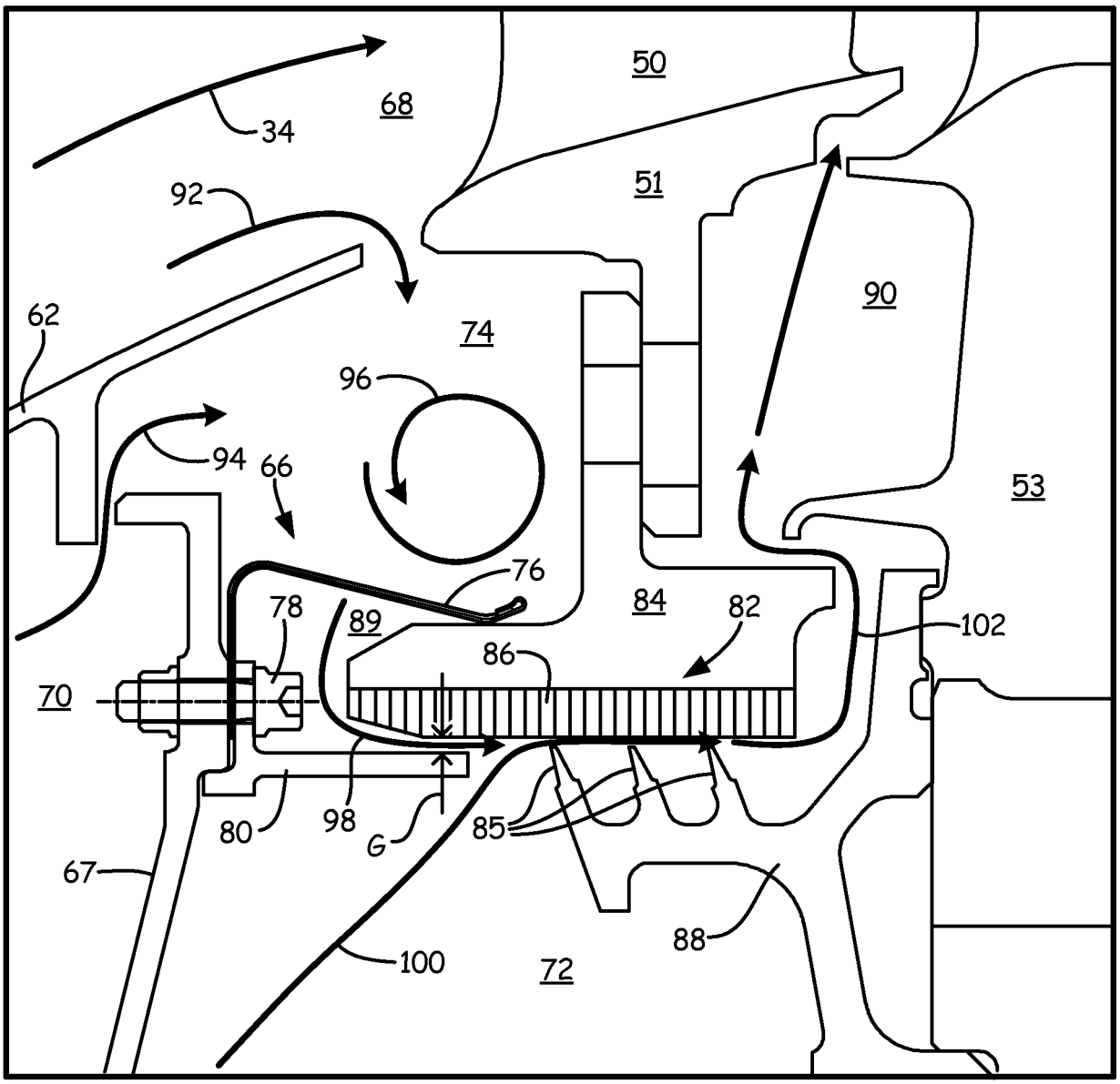
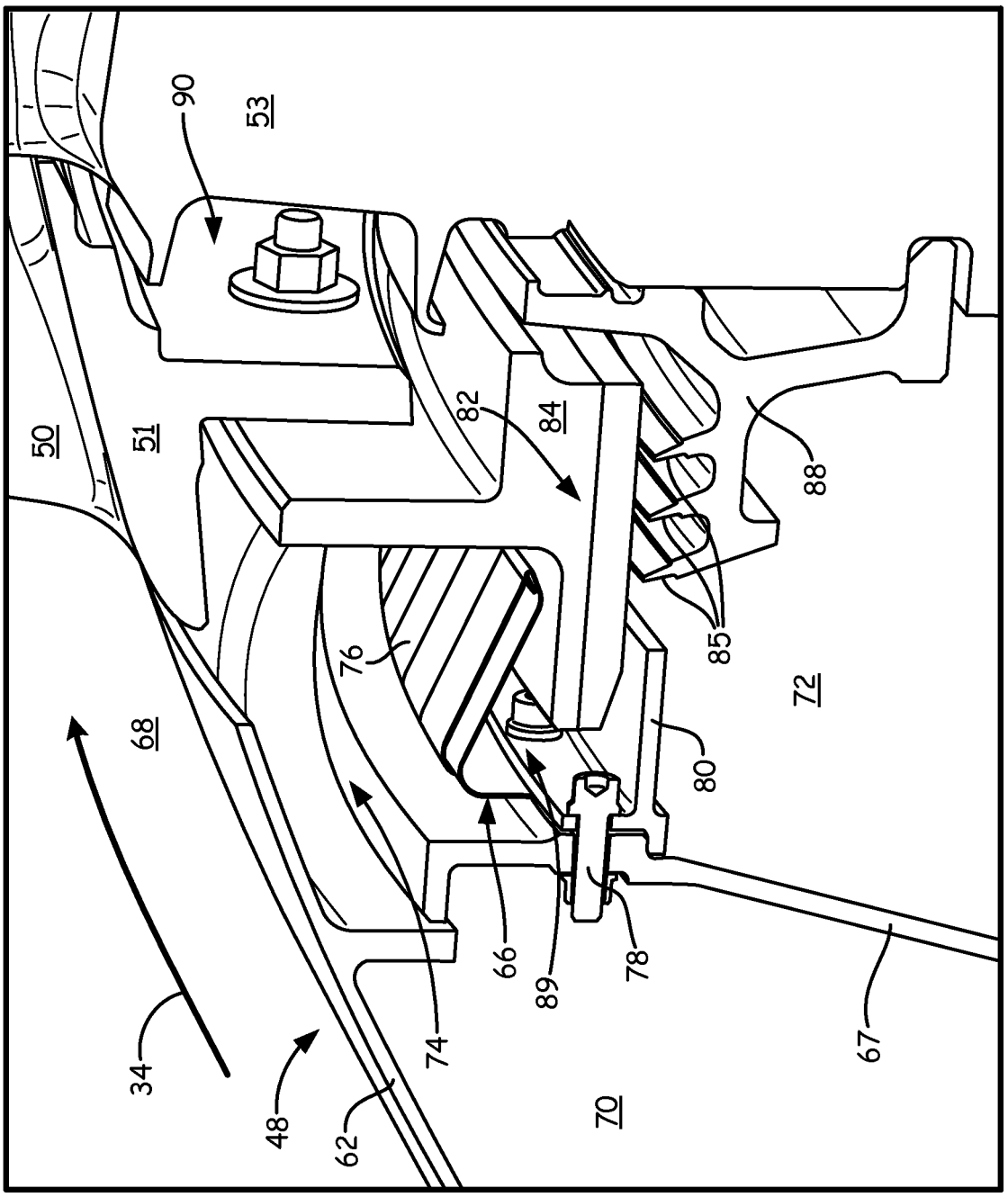

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Fig. 3A

Fig. 3B



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1780380 A **[0004]**
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